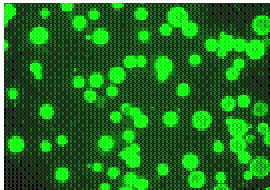


# Unique Polymeric Materials by Novel Processes

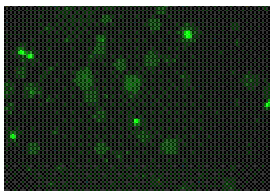
Joseph P. Kennedy, The University of Akron; DMR-0243314

**Intellectual Merit:** The creation of novel biocompatible synthetic semipermeable membranes that undergo rapid reversible changes dictated by the environment. These “smart” membranes are of great interest for biological/medical applications, e.g., protectively encapsulating living cells (immunoisolation).

We have designed and prepared such membranes, and demonstrated that they permit the rapid in- and out-diffusion of glucose (MW=180) and insulin (MW=5773), but prevent the diffusion of even the smallest immunoprotein IgG (MW=150,000).

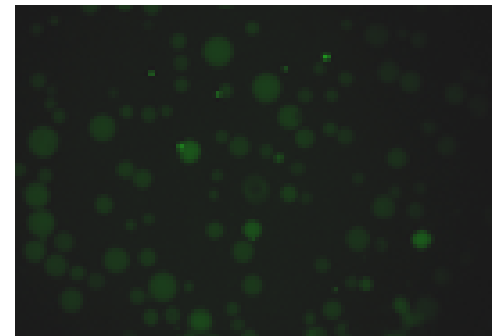


The positive control shows an IgG-permeable membrane.



The negative control shows an IgG-nonpermeable membrane.

**Experimental result: Our membrane is not IgG permeable even after 120 hrs.**



# Broader Impacts: Dissemination of Knowledge and Technology Generated under DMR-0243314

## Education and Outreach

Research involved 3 postdoctorals, 2 visiting scholars, and 3 graduate students. Numerous undergraduate students visited our labs. This research provided relevant examples for a series of graduate-level lectures on “Intellectual Property and the Professional Scientist” given by the PI.

## Major Publications

- R. M. Peetz, A. Moustafa, and J. P. Kennedy “Synthesis and Characterization of Two Novel Star-Blocks:  $t$ Cum[poly(isobutylene-*b*-norbornadiene)]<sub>3</sub> J. Polym. Sci., Part A, Polym. Chem., **41**(6), 740 (2003)
- I. Isayeva, B. Kashiblata, K. S. Rosenthal, and J. P. Kennedy, “Characterization and Biological Performance of Membranes Designed for Macroencapsulation/Implantation of Cells”, Biomaterials, **24**(20), 3483 (2003)
- P. Kurian, B. Kashiblata, J. Daum, C. A. Burns, M. Moosa, K. S. Rosenthal and J. P. Kennedy, “Synthesis, Permeability and Biocompatibility of Tricomponent Membranes Containing Polyethylene Glycol, Polydimethylsiloxane and Polypentamethylcyclopentasiloxane Domains”, Biomaterials, **24**(20), 3493 (2003)
- R. M. Peetz, A. Moustafa, and J. P. Kennedy “Cationic Polymerization of Norbornadiene”, J. Polym. Sci., Part A, Polym. Chem., **41**(6), 732 (2003)

## Patents

6,727,322 B2 J. P. Kennedy and I. Isayeva “Amphiphilic Networks, Implantable Immunoisulatory Devices, and Methods of Preparation” to The University of Akron (2004)

Two patent applications filed at the US patent Office.

## Major Invited Presentations Given by the PI

- “Carbocationic Polymerizations for Profit and Fun” ACS, Natl. Meet., Anaheim, CA March 28, 2004
- World Polymer Congress, Macro 2004, 40th Intl. Symp. on Macromolecules “Novel “Smart” Amphiphilic Polymers For Immunoisolation”, Paris France, July 4-9, 2004
- “Novel “Smart” Amphiphilic Polymers For Immunoisolation” Hungarian Academy of Sciences, Budapest, Hungary, July 19, 2004